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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/737,277

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Masayoshi Omura

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EXAMINER

ROSENAU, DEREK JOHN

ART UNIT

PAPER NUMBER

2834

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/737,277	Applicant(s) OMURA ET AL.	
	Examiner Derek J. Rosenau	Art Unit 2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/30/04 10/27/06</u> | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 33. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "3" has been used to designate both an ultrasonic transducer and the line through which the cross-sectional view of Fig 3 is made. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either

"Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

3. The disclosure is objected to because of the following informalities. On page 2, "contains water with the low acoustic-attenuation" is grammatically incorrect. On page 9, "grand line" should be "ground line." On page 12, "The backing member mounted on the ultrasonic transducer is filled with magnetic powders such as ferrite and thus artifact which prevents the diagnosis might be caused in the MRI image" is grammatically incorrect. On page 14, "preferable waterproof" is grammatically incorrect.

Appropriate correction is required.

### ***Claim Objections***

4. Claims 5 and 6 recites the limitation "the acoustic medium." There is insufficient antecedent basis for this limitation in these claims.

5. Claim 1 is objected to because of the following informalities: "on a surface opposed side of the acoustic matching layer" is grammatically incorrect. Appropriate correction is required.

6. Claims 2, 7, and 8 are objected to because of the following informalities: "the hardness of 80 to 100 degrees" should be "a hardness of 80 to 100 degrees" and "the ultrasonic absorbing coefficient of 10 or more" should be "an ultrasonic absorbing coefficient of 10 or more." Appropriate correction is required.

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7. Claims 3 and 8 are objected to because of the following informalities: "the percentage of absorption" should be "a percentage of absorption" and "the acoustic impedance" should be "an acoustic impedance." Appropriate correction is required.

8. Claim 6 is objected to because of the following informalities: "oil with the low attenuation of ultrasonic waves" should be "oil with low attenuation of ultrasonic waves." Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1-5, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kami et al. (US 5176140) in view of Kinoshita et al. (US 5722644).

11. With respect to claim 1, Kami et al. discloses an ultrasonic probe (Fig 35) comprising an ultrasonic transducer, the ultrasonic transducer further comprising, by sequential lamination: an acoustic lens (item 71); an acoustic matching layer (item 62); a piezoelectric element (item 61); and a backing member (item 63); wherein the backing member is for attenuating ultrasonic waves (column 14, lines 10-13), and is arranged on a surface opposite the acoustic matching layer and acoustic lens (Fig 35).

Kami et al. does not disclose expressly that the backing (damping layer) contains a synthetic rubber having a mixture including acrylonitrile-butadiene rubber, ethylene-propylene terpolymer, and at least inorganic fine powders.

Kinoshita et al. teaches that is well known to form a vibration-damping material of a mixture that includes acrylonitrile-butadiene rubber, ethylene-propylene terpolymer, and at least inorganic fine powders (column 1, line 65 through column 2, line 17).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the vibration-damping material of Kinoshita et al. with the ultrasonic transducer of Kami et al. for the benefit of the self-adhesive properties of the material (column 1, lines 65-67).

12. With respect to claim 2, the combination of Kami et al. and Kinoshita et al. discloses an ultrasonic probe according to claim 1. While neither Kami et al. nor Kinoshita et al. discloses expressly that the backing member has, as the properties, the hardness of 80 to 100 degrees in the A scale in conformity with JISK6253 and the ultrasonic absorbing coefficient of 10 or more dB/mm at the frequency of 5 MHz, it has long been held that it is obvious to discover optimum or workable ranges by routine experimentation (*In re Aller*, 105 USPQ 233). As Kinoshita et al. discloses the constituent materials of the claimed synthetic rubber, it would have been obvious to use a material with a hardness of 80 to 100 degrees in the A scale in conformity with JISK6253 and an absorbing coefficient of 10 or more dB/mm at 5 MHz, as these material properties could be achieved through routine experimentation.

13. With respect to claim 3, the combination of Kami et al. and Kinoshita et al. discloses an ultrasonic probe according to claim 1. Kami et al. discloses an exterior cap which immerses the ultrasonic transducer in an acoustic medium (column 27, lines 47-55). While neither Kami et al. nor Kinoshita et al. discloses expressly that the backing

member immersed in the acoustic medium has the percentage of absorption of 2.5% or less and the acoustic impedance within a range of  $1 \times 10^6$  to  $8 \times 10^6$  kg/(m<sup>2</sup>s), it has long been held that it is obvious to discover optimum or workable ranges by routine experimentation (*In re Aller*, 105 USPQ 233). As Kinoshita et al. discloses the constituent materials of the claimed synthetic rubber, it would have been obvious to use a material having a percentage of absorption of 2.5% or less and an acoustic impedance between  $1 \times 10^6$  and  $8 \times 10^6$  kg/(m<sup>2</sup>s), as these material properties could be achieved through routine experimentation.

14. With respect to claim 4, the combination of Kami et al. and Kinoshita et al. discloses an ultrasonic probe according to claim 1. Kami et al. discloses a flexible shaft which rotates the ultrasonic transducer by a driving motor (column 27, lines 47-63).

15. With respect to claim 5, the combination of Kami et al. and Kinoshita et al. discloses an ultrasonic probe according to claim 1. Kami et al. discloses a coating film (Fig 1, item 103), which covers the ultrasonic transducer and protects it from the acoustic medium.

16. With respect to claim 7 and 8, the combination of Kami et al. and Kinoshita et al. discloses an ultrasonic probe according to claim 1. Kami et al. discloses a piezoelectric element which receives and transmits ultrasonic waves (column 6, lines 5-13); and a backing member which is arranged to the rear surface of the piezoelectric element (Fig 35). Kinoshita et al. discloses that the backing member is a mixture including acrylonitrile-butadiene rubber, ethylene-propylene terpolymer, and at least inorganic fine powders (column 1, line 65 through column 2, line 17). While neither Kami et al. nor

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Kinoshita et al. discloses expressly that the backing member has, as the properties, a hardness of 80 to 100 degrees in the A scale in conformity with JISK6253, an ultrasonic absorbing coefficient of 10 or more dB/mm at the frequency of 5 MHz, a percentage of absorption of 2.5% or less, or an acoustic impedance between  $1 \times 10^6$  and  $8 \times 10^6$  kg/(m<sup>2</sup>s), it has long been held that it is obvious to discover optimum or workable ranges by routine experimentation (*In re Aller*, 105 USPQ 233). As Kinoshita et al. discloses the constituent materials of the claimed synthetic rubber, it would have been obvious to use a material with a hardness of 80 to 100 degrees in the A scale in conformity with JISK6253, an absorbing coefficient of 10 or more dB/mm at 5 MHz, a percentage of absorption of 2.5% or less, and an acoustic impedance between  $1 \times 10^6$  and  $8 \times 10^6$  kg/(m<sup>2</sup>s), as these material properties could be achieved through routine experimentation.

17. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kami et al. in view of Kinoshita et al. in further view of Wakabayashi et al. (US 5884627).

18. With respect to claim 6, the combination of Kami et al. and Kinoshita et al. discloses an ultrasonic probe according to claim 1.

Neither Kami et al. nor Kinoshita et al. discloses expressly that the acoustic medium is water with low attenuation of ultrasonic waves, an aqueous solution obtained by adding an additive to water, or oil with the low attenuation of ultrasonic waves.

Wakabayashi et al. teaches an ultrasonic probe having a rotatably driven ultrasonic transducer at the end of a flexible shaft in which an exterior cap immerses the transducer in an acoustic medium of water (column 11, lines 14-17).



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At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the acoustic medium of Wakabayashi et al. with the ultrasonic transducer of Kami et al. as modified by Kinoshita et al. for the benefit of using an acoustic medium having an acoustic velocity that is substantially equal to the organism (human body) being scanned (column 11, line 63 through column 12, line 2), as humans are made up of mostly water.

### ***Conclusion***

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Koehler et al. (US 5317229) discloses an ultrasonic transducer having an exterior cap which immerses the transducer in an acoustic medium, such as water (column 4, lines 52-56). Suzuki et al. (US 6599640) discloses a vibration dampening rubber body that includes various synthetic rubbers, including acrylonitrile butadiene rubber, and ethylene-propylene rubber; however, the vibration dampening material does not include inorganic fine powders.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is 571-272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

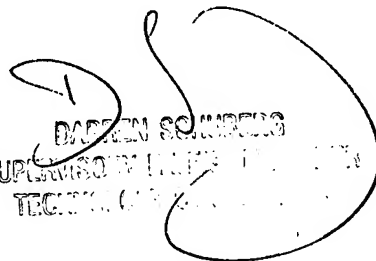
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Derek J Rosenau  
Examiner  
Art Unit 2834

DJR  
11/30/2006

  
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